METHOD AND SYSTEM FOR CACHE COHERENCE IN DSM MULTIPROCESSOR SYSTEM WITHOUT GROWTH OF THE SHARING VECTOR

ABSTRACT OF THE DISCLOSURE

The present invention is directed to a method and a system for maintaining cache coherence in a distributed shared memory (DSM) multiprocessor system. The method begins with a receiving of a shared access request by a receiving node, where the receiving node is an arbitrary node having at least one main memory unit containing information desired to be accessed. Then, the method determines whether the shared access request originates from a local node or from a remote node. When the shared access request originates from a local node, the shared access request is processed as a shared access request. If the shared access request is granted, a sharing vector is generated or updated to reflect the sharing local node(s). When the shared access request originates from a remote node, the shared access request is converted to an exclusive access request and the sharing vector is replaced with a pointer to the requesting remote node. This limits the potential size of the sharing vector according to the local nodes.

FIG. 1.

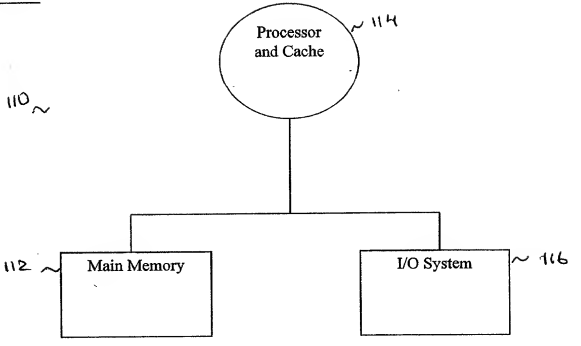

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FIG. 2.

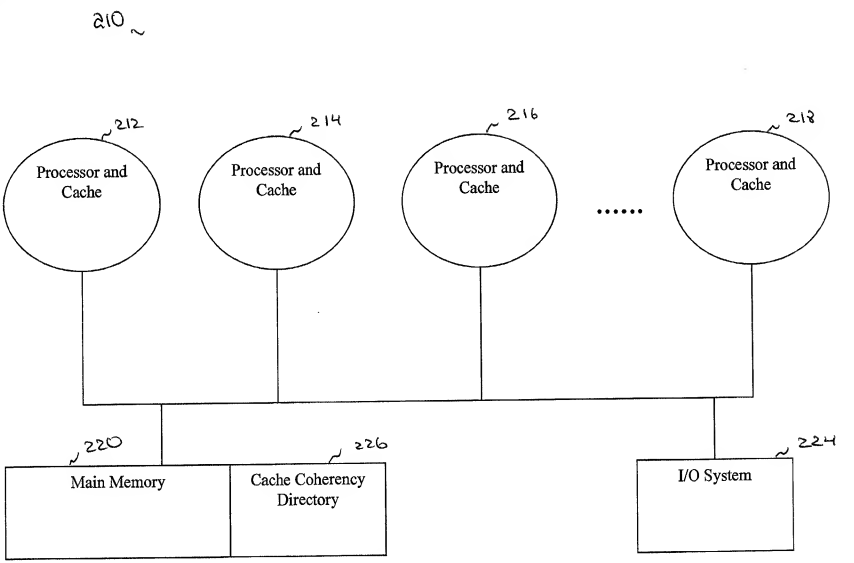

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FIG. 3.

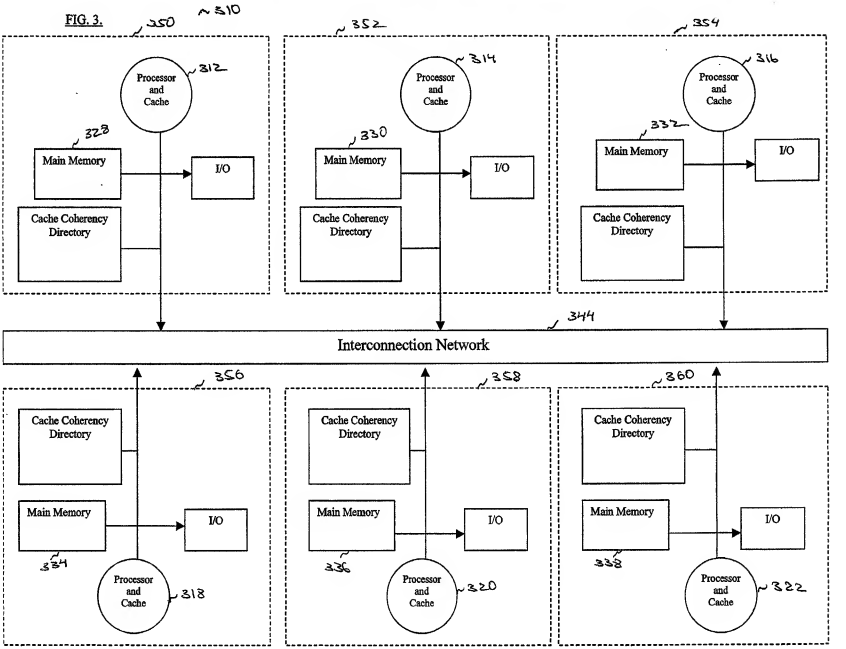


FIG. 4.

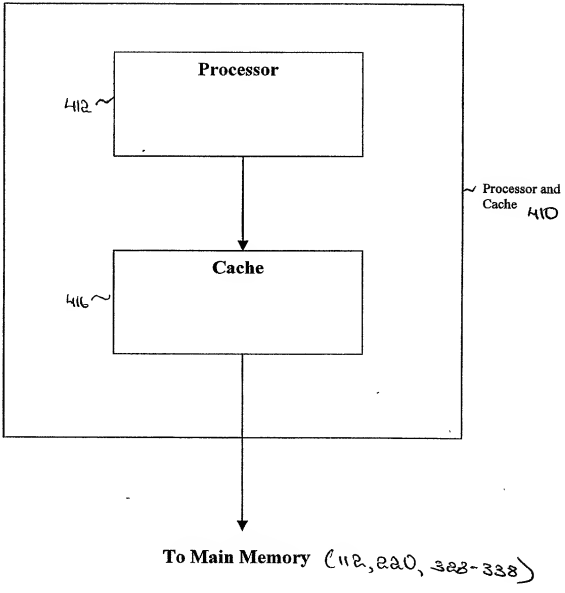

Processor
412
Processor and Cache 410
Cache
416
To Main Memory (112, 220, 332-338)

Fig 5a

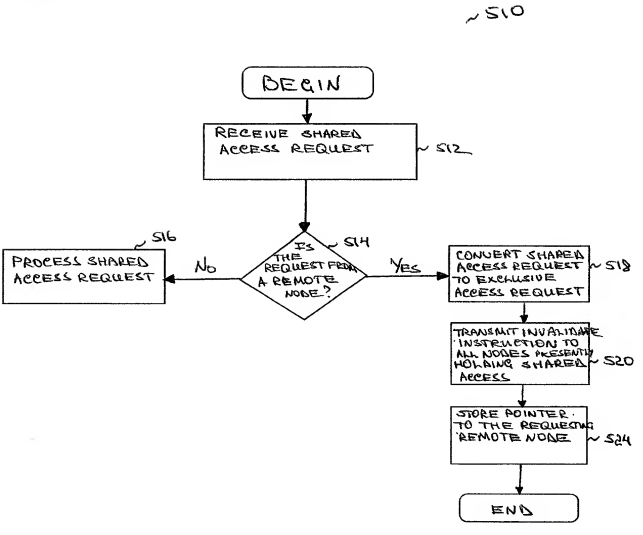
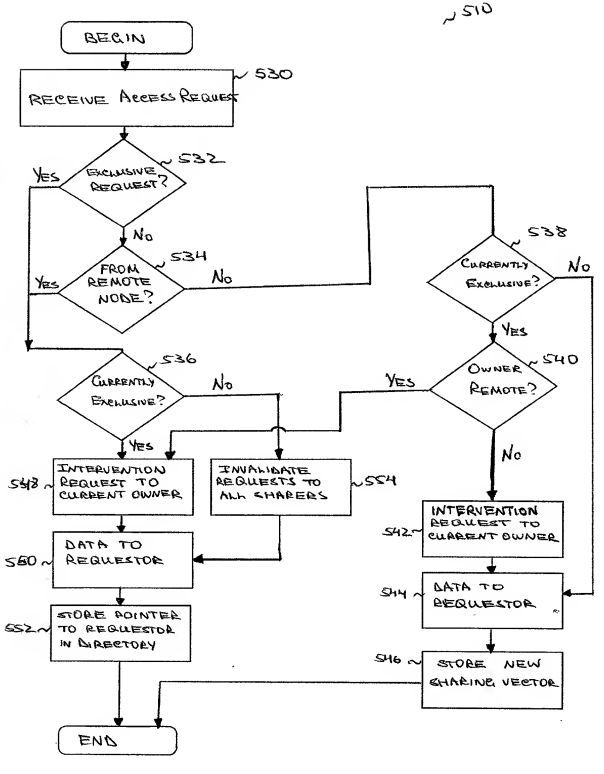

510
BEGIN
RECEIVE SHARED ACCESS REQUEST
512
IS THE REQUEST FROM A REMOTE NODE?
514
No
Yes
PROCESS SHARED ACCESS REQUEST
516
CONVERT SHARED ACCESS REQUEST TO EXCLUSIVE ACCESS REQUEST
518
TRANSMIT INVALIDATE INSTRUCTION TO ALL NODES PRESENTLY HOLDING SHARED ACCESS
520
STORE POINTER TO THE REQUESTING REMOTE NODE
524
END

Fig 5b


510
BEGIN
530
RECEIVE ACCESS REQUEST
532
EXCLUSIVE REQUEST?
YES
NO
534
FROM REMOTE NODE?
YES
NO
536
CURRENTLY EXCLUSIVE?
NO
YES
538
CURRENTLY EXCLUSIVE?
NO
YES
540
OWNER REMOTE?
YES
NO
548
INTERVENTION REQUEST TO CURRENT OWNER
554
INVALIDATE REQUESTS TO ALL SHARERS
560
DATA TO REQUESTOR
552
STORE POINTER TO REQUESTOR IN DIRECTORY
542
INTERVENTION REQUEST TO CURRENT OWNER
544
DATA TO REQUESTOR
546
STORE NEW SHARING VECTOR
END

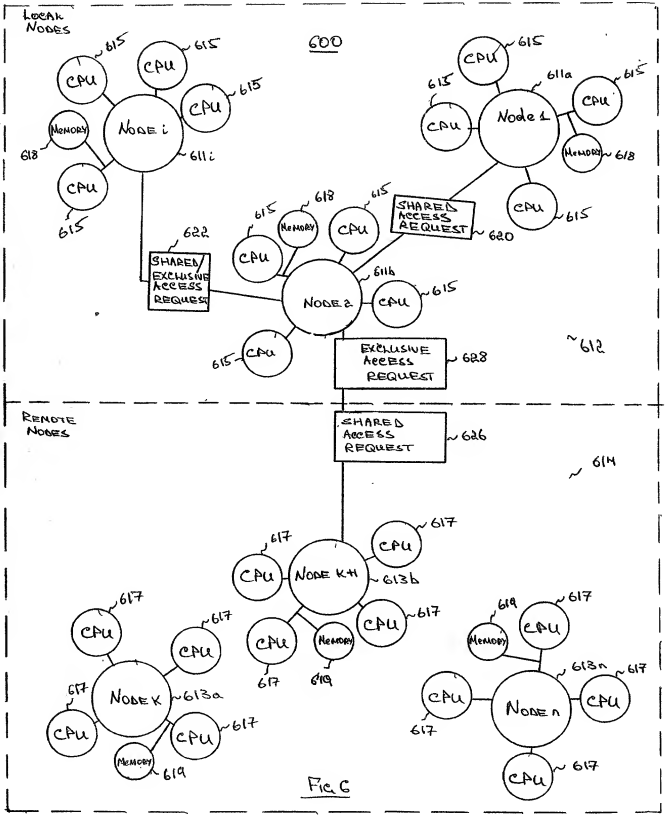

LOCAL NODES
600
CPU
MEMORY
NODE i
611i
NODE 1
611a
NODE 2
611b
NODE K+1
613b
NODE K
613a
NODE n
613n
615
618
619
617
622
SHARED/EXCLUSIVE ACCESS REQUEST
SHARED ACCESS REQUEST
620
EXCLUSIVE ACCESS REQUEST
628
612
REMOTE NODES
SHARED ACCESS REQUEST
626
614

Fig 6

Declaration for Patent Application

Docket Number: 1452.3730000

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed and for which a patent is sought on the invention entitled:
Method and System for Cache Coherence in DSM Multiprocessor System without Growth of the Sharing Vector

the specification of which is attached hereto unless the following box is checked:

☐ was filed on _____;
as United States Application Number or PCT International Application Number _____; and
was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information that is material to patentability as defined in 37 C.F.R. § 1.56, including for continuation-in-part applications, material information that became available between the filing date of the *prior application* and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or (f), or § 365(b) of any foreign *application(s)* for patent, inventor's or plant breeder's rights certificate(s), or § 365(a) of any PCT international application, which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Claimed
(Application No.)	(Country)	(Day/Month/Year Filed)	☐ Yes ☐ No
(Application No.)	(Country)	(Day/Month/Year Filed)	☐ Yes ☐ No

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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